WHAT IS CLAIMED IS:

1. An optical element comprising:

a substrate;

a first diffraction grating disposed on the substrate and having a period that is shorter than a light wavelength used; and

a second diffraction grating disposed on the first diffraction grating and having a period that is shorter than the light wavelength used,

wherein the melting point of a material of the first diffraction grating is higher than the melting point of a material of the second diffraction grating.

2. An optical element according to Claim 1, wherein the material of the first diffraction grating is at least one of a metal and a metallic compound, and wherein the material of the second diffraction grating is at least one of a metal and a metallic compound, and is different from the material of the first diffraction grating.

3. An optical element according to Claim 1, wherein a diffusion coefficient of the material of the first diffraction grating is greater than a diffusion coefficient of the material of the second diffraction grating.

4. An optical element according to Claim 1, wherein the materials of the first and second diffraction gratings are each any one of aluminum, gold, silver, chromium, zirconium, titanium, copper, tungsten, magnesium, tantalum, platinum, and a compound thereof.

5. An optical element according to Claim 1, wherein a thin MgF_2 or Na_3AlF_6 film is disposed between the substrate and the first diffraction grating.

6. An optical element according to Claim 1, wherein each grating period that is shorter than the light wavelength used falls in a range of from at least 30 nm to 200 nm at most.